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LIGHT RAILWAYS

PRACTICAL HINTS
FOR
LIGHT RAILWAYS
AT HOME AND ABROAD

BY

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CONTENTS.

PAGE

INTRODUCTORY 1

ALIGNMENT AND LAND 5

GAUGE 6

EARTH WORK 7

BRIDGE WORK 8

FENCING 9

BALLAST 9

PERMANENT WAY 9

ROLLING STOCK 11

TRADING AND TRANSHIPMENT FACILITIES 11

STATION EQUIPMENT 14

COST AND WORKING 16

APPENDIX: RESOLUTION OF THE GOVERNMENT OF INDIA REGARDING CONCESSIONS FOR FEEDER RAILWAYS (from the *Gazette of India*, dated 17th April, 1896) 23

PRACTICAL HINTS

FOR

LIGHT RAILWAYS.

INTRODUCTORY.

THE question of light railways has been brought very prominently before the public of late, but so far little of a practical nature has been done, and although the subject would appear to have a considerable interest for the merchant, farmer and man of business generally, as being a possible something which might improve trade, one and all somehow fail to get much further than discussion. The writer ventures to think that the public generally are not so much to blame as the professional men who advise them, and who, with a few exceptions, have not the courage to advocate anything except the standard gauge, whatever it may be, of the country they reside in.

If ever light railways are to be light railways in the proper sense of the term, and if they are to be a pecuniary success, which in many districts, under proper management, would be pretty well assured, the idea of adhering to one or other of the wide gauges must be dismissed at once. A light railway in Great Britain on the 4-feet 8½-inch or 5-feet 3-inch gauge, in Africa on the 3-feet 6-inch, or in India on the 5-feet 6-inch or metre gauge, as the case may be, is simply a branch line, neither more nor less, and the cost can only be less than that of the parent line at the expense of efficiency, and even then not low enough to enable a paying line to be made in many districts.

The question and cost of transhipment has been much over-estimated, and magnified out of all proportion to the actual difficulties involved.

At the present time thousands of tons of goods are brought to railway stations in carts, and transferred to trucks under difficulties greater than would be the case if proper arrangements were made at the junction of a narrow with a wide gauge line.

What is required is to give facilities to the farmer and trader which would make it worth their while to dispense with cartage, and at the same time to construct a railway which would give the investor not less than 4 per cent. for his money.

To attain this end it may be taken that lines of 2-feet or 2-feet 6-inch gauge, generally not less than

20 miles long at home or 40 miles in the colonies, and speeds of 8 to 12 miles an hour, would be found to have the best chance of success; whilst in all probability even a trunk line on the 2-feet 6-inch gauge would serve every necessary purpose in some of the pastoral districts of our colonies.

In India and Ceylon, millions have been spent in making the broad 5-feet 6-inch gauge, only in many cases to run two or three trains a day, so that for hours together all the staff and paraphernalia of a huge railway equipped with every known modern, and in many cases unnecessary, appliance, stands to a great extent idle, doing nothing but rusting the rails of its permanent way and the brains of its employees, who, in India at any rate, spend much of their spare time in useless correspondence.

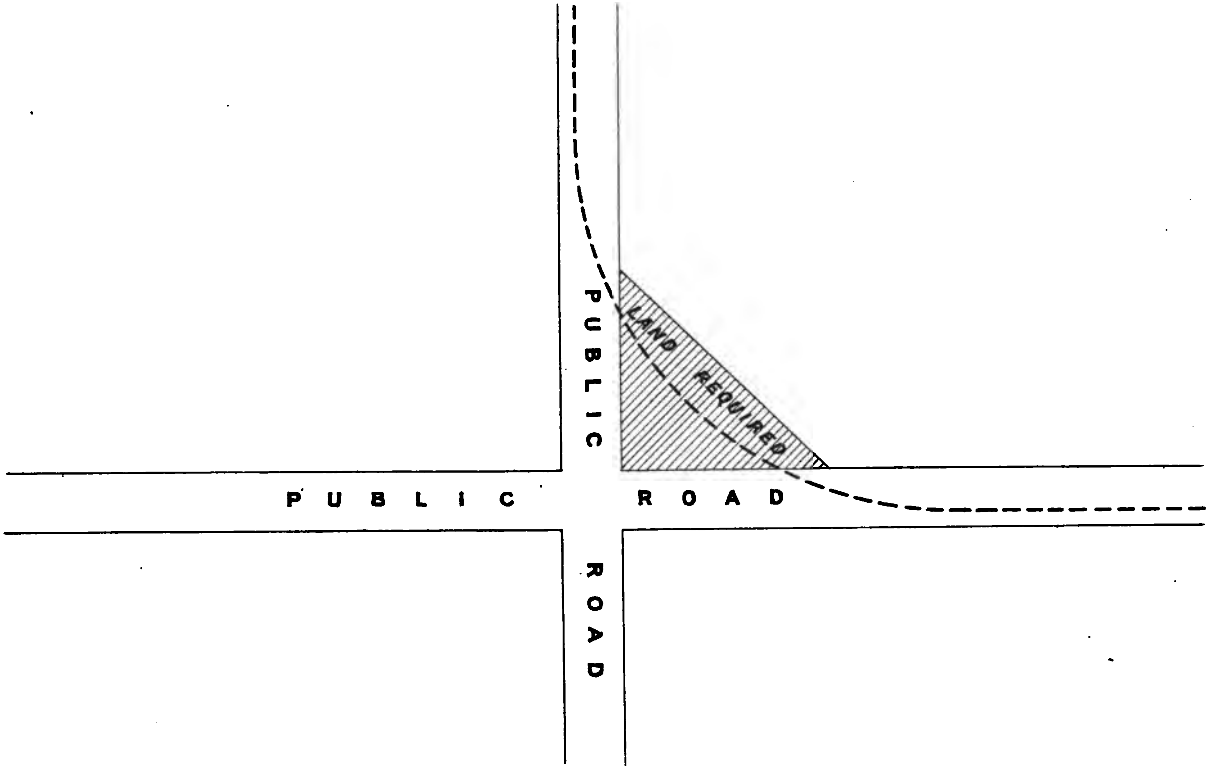
Again, Ireland would undoubtedly have been a much more prosperous country had she possessed a network of light railways on the 2-feet 6-inch gauge, instead of the present 5-feet 3-inch gauge, which is out of all proportion to her needs, and hangs like a mill-stone round her neck, with the result that the lines are in most cases badly worked, badly maintained, do not pay, and stand in the way of all progress.

In the writer's opinion the only remedy now available in her case would be for the Government to purchase all the existing railways on the 5-feet 3-inch gauge, with the exception of such as it might be advisable to leave as trunk lines; transfer all the rolling stock to the latter, and alter the gauge of the former to 2 feet 6 inches, and extend on that gauge in future.

Government has on more than one occasion proposed to purchase the Irish lines, and now, when in many cases bridges have to be strengthened to meet the heavier axle loads in vogue, would be the time to take over at any rate a part of them and reduce the gauge, rather than that more money should be spent in making them efficient for loads which are not required. On the Great Western, in Cornwall, there is a recent example of the comparative ease with which a broad gauge can be narrowed.

With regard to Government legislation at home, what is required in place of the routine, time and expense necessary before a Bill can be obtained when it is proposed to construct a standard gauge line, is that the procedure should be simplified, so as to take the form of a local inquiry, held by an officer of the Board of Trade, who should be empowered to grant a license to construct and work a light line when a majority of the ratepayers in a district are in its favour, and possibly to grant a loan towards construction, if the promoters can

Fig. 1.



furnish the necessary security, and the prospects of the line are sufficiently good to warrant it. In any case, however, the procedure should be simple, and the requirements in the shape of plans, specifications and working rules only sufficient to protect the public from ill-considered or badly managed schemes.

ALIGNMENT AND LAND.

In Great Britain, at least to avoid expense as regards land, a light railway should follow the course of the turnpike roads, being placed as near to one side as possible, and in most cases it would be found that there was a sufficient width close to the hedge or dyke, which is never used, and the line would therefore encroach but little upon the actual limits of the wheeled traffic.

Probably curves of 3, 5 and 10 chains, i.e. 198, 330 and 660 feet radius, would be found to meet all cases in practice.

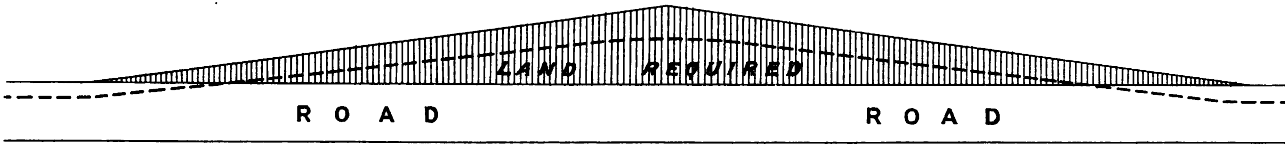
Where a right angle had to be turned, as at many cross roads, a small triangular piece of land (Fig. 1) would require to be taken up for the curve. This, under ordinary circumstances, would not exceed ⅛ of an acre for 3 chains, or ½ an acre for 5 chains radius. Again, where the grade exceeded say 1 in 30, which it would be advisable to accept as a maximum for the 2-feet 6-inch gauge, it would be necessary to leave the road (Fig. 2) and run as close, and as nearly parallel as possible to avoid severance, returning again as soon as the grade permitted.

Probably on most of the principal roads this would rarely be necessary more than once in a mile, or the extra land required to be taken up exceed 1 acre, and generally as regards land it may be assumed that where roads are used, 1½ acres, and where the railway is aligned irrespective of them, 4 acres per mile, would cover most contingencies.

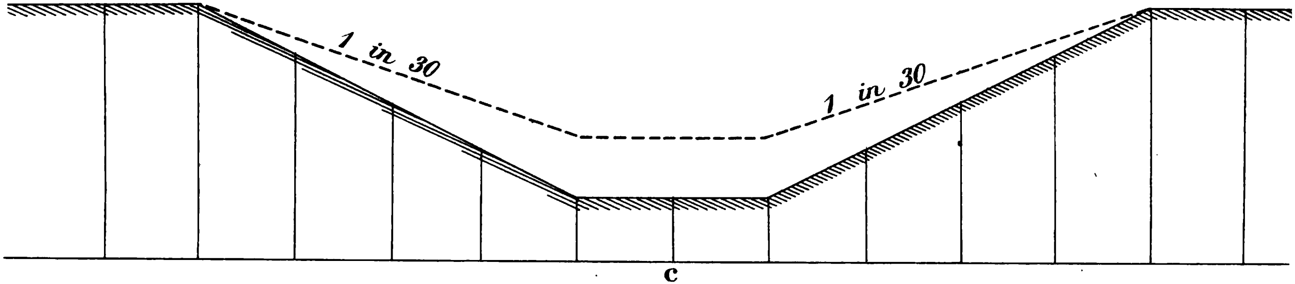
GAUGE.

In the writer's opinion, 2 feet or 2 feet 6 inches should be the gauge for a light railway: 1 foot 6 inches, although successfully used at Chatham and Woolwich by the Royal Engineers, and at the locomotive works at Crewe by the London and North Western Railway, is too small for a line of any length, and 3 feet, metre, and 3 feet 6 inches come more within the category of gauges suitable for trunk

Fig. 2.



PLAN.



SECTION.

lines for populous and cultivated colonial districts; whilst at home they would certainly be too cumbersome and expensive to prove any help to the British farmer. In Wales the Festiniog Railway of 2-feet gauge has a world-wide fame, whilst in India there are four light railways of 2-feet 6-inch gauge, two of which, the Gaekwars and Morvi, respectively 71·6 and 94·3 miles long, have proved most successful. The other two, probably to a certain extent owing to their short length (20 to 30 miles), have not turned out so well.

Which of the two gauges recommended would prove the best, could only be determined in each case by going into the question of the probable nature and extent of the traffic on the spot, coupled with an examination of the physical configuration of the country along the line of route.

EARTH WORK.

A formation width of 8 to 10 feet would be advisable, with slopes as usual generally varying between 1 to 1 and 2 to 1. The cost, of course, would vary much with the hardness of the soil and configuration of the country, but would generally lie between 150*l.*

and 300*l.* a mile, the former in the case of the alignment principally following that of the existing roads with occasional deviations, and the latter in the case of somewhat rough country, where, however, there was no rock excavation.

BRIDGE WORK.

For a light line and slow speed, no over bridges should be required, and all that is necessary is to pass the drainage of the country as cheaply as possible.

Culverts of mass concrete made with gravel or broken stone, and hydraulic lime or cement, requiring little or no skilled labour beyond the making of the necessary framing, which should only be provided for three or four standard sizes to suit most of the cases likely to occur in practice, would probably prove the most economical mode of construction; but careful supervision would be required to ensure good work.

Where the alignment followed the existing highways, but little would be wanted, and elsewhere it is difficult to estimate approximately, so varied would the circumstances be in actual practice, but probably from 100*l.* to 300*l.* a mile would often suffice.

FENCING.

A little expenditure on fencing would be required at road deviations and stations, and on the average 50*l.* a mile might be set down for this where the roads were principally followed.

BALLAST.

From 5 feet by 9 inches to 6 feet by 1 foot, depending on the gauge, &c., should be provided of broken stone or gravel.

PERMANENT WAY.

For a 2-feet 6-inch gauge, and loads not exceeding 2½ to 3 tons per wheel, a steel rail weighing 35 lbs. to the yard would be ample.

The metre gauge lines in India now use a 50 lb. steel rail with engines having up to 4 tons on a wheel. The permanent way at present rates (1895) delivered F.O.B. at many ports in India, Africa, or South America, would cost approximately as follows for the 2-feet 6-inch gauge per mile.

Flanged steel rails (35 lbs.) ..	£231
Fish plates	17
Fish bolts	13
Spikes	23
Bearing plates (¼ mile)	6
Wood sleepers (often local)	160
Total per mile	£450

In most parts of Great Britain this material would be delivered for 350*l.* to 400*l.*, and laying might be estimated roughly at 50*l.* per mile. The handling charges and carriage to destination would, of course, vary considerably, but in India a mile of material as detailed, including sleepers, could be loaded into trucks, carried 500 miles and unloaded at a cost not exceeding 100*l.*

Wood sleepers have been estimated for, but in many cases, particularly in India, cast-iron oval pot sleepers connected with wrought-iron tie bars would be more suitable.

The initial cost would be greater, probably 150*l.* to 200*l.* per mile, but the saving in maintenance considerable, and the life of the sleepers more than double.

ROLLING STOCK.

Under ordinary circumstances, for a line say 50 miles long, the following rolling stock would be required.

4	Fairlie engines	£7200
4	Bogie passenger carriages, each with 7 compartments, and a break van	1050
75	Goods trucks	3750
75	Coal and lime trucks	3350
25	Cattle trucks	1500
10	Timber trucks	450
2	Brake vans	200
195	Vehicles .. Total ..	£17,500

Or, say at the rate of 350*l.* per mile for lines 30 to 70 miles in length.

TRADING AND TRANSHIPMENT FACILITIES.

For a light railway to be of any real help to the farmer or trader, it must not only go to his doors but within them as far as possible. Opposite the approach road to the farm or works there should be a loop siding having either a turntable in its centre (for trucks only) with a connecting siding at right angles, or a curved connection from the loop, whichever is the cheaper and more feasible. The connecting line from the loop being for hand or horse shunted trucks only, might be of cheaper construction, provided, however, with a system of turntables (costing about 5*l.* each), so that the trucks could be taken to the very spot where they were required (Figs. 3 and 4).

It would probably be best for the company to provide, fix and keep the turntables in order, at a small annual rent, say 5*s.* each, and for the farmer or trader to pay outright for the connecting sidings, which the company would lay in for him if he wished, complete, at a cost probably not exceeding 3*s.* per yard, so that where 200 yards was required, and five turntables, the cost to the farmer or trader would not exceed 30*l.* down and a yearly payment of 25*s.* With regard to transhipment at the junction between the standard and narrow gauge, there should be a raised bank for the narrow gauge lines, between two standard gauge sidings, placed say 20 feet apart centre to centre, approached by a grade of say 1 in 40 to 1 in 60, and the height should be such that the floors of the narrow gauge trucks will be about 12 inches above the floors of the standard

Fig. 3.

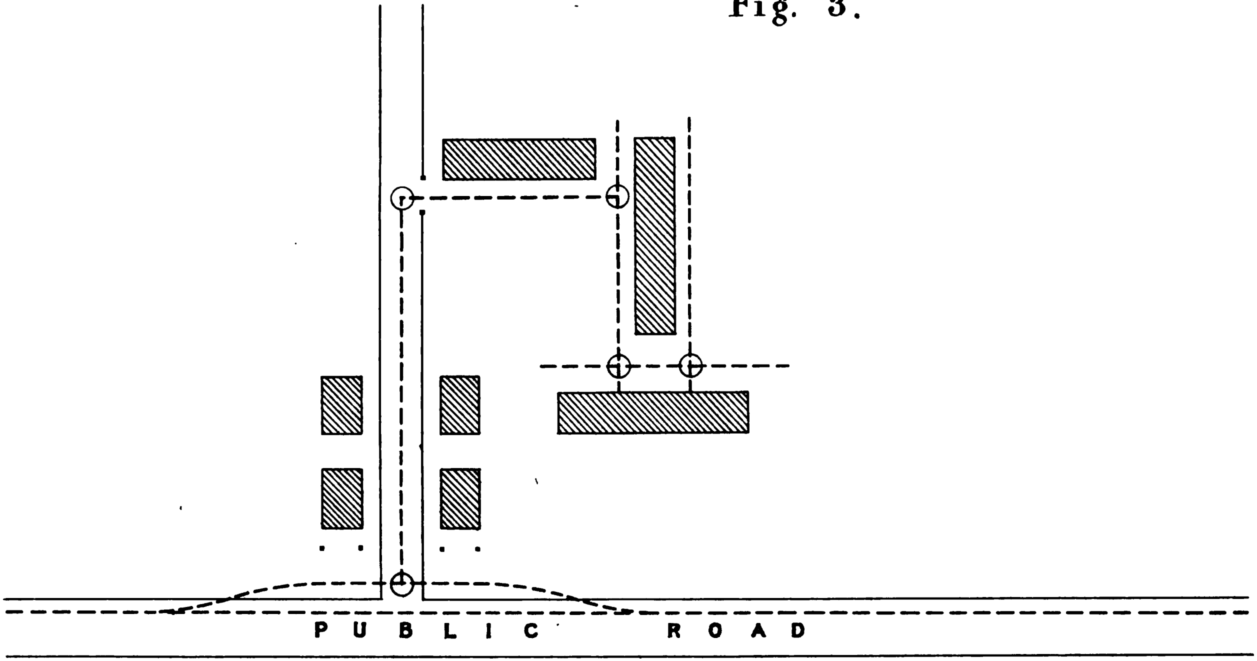


Fig. 4

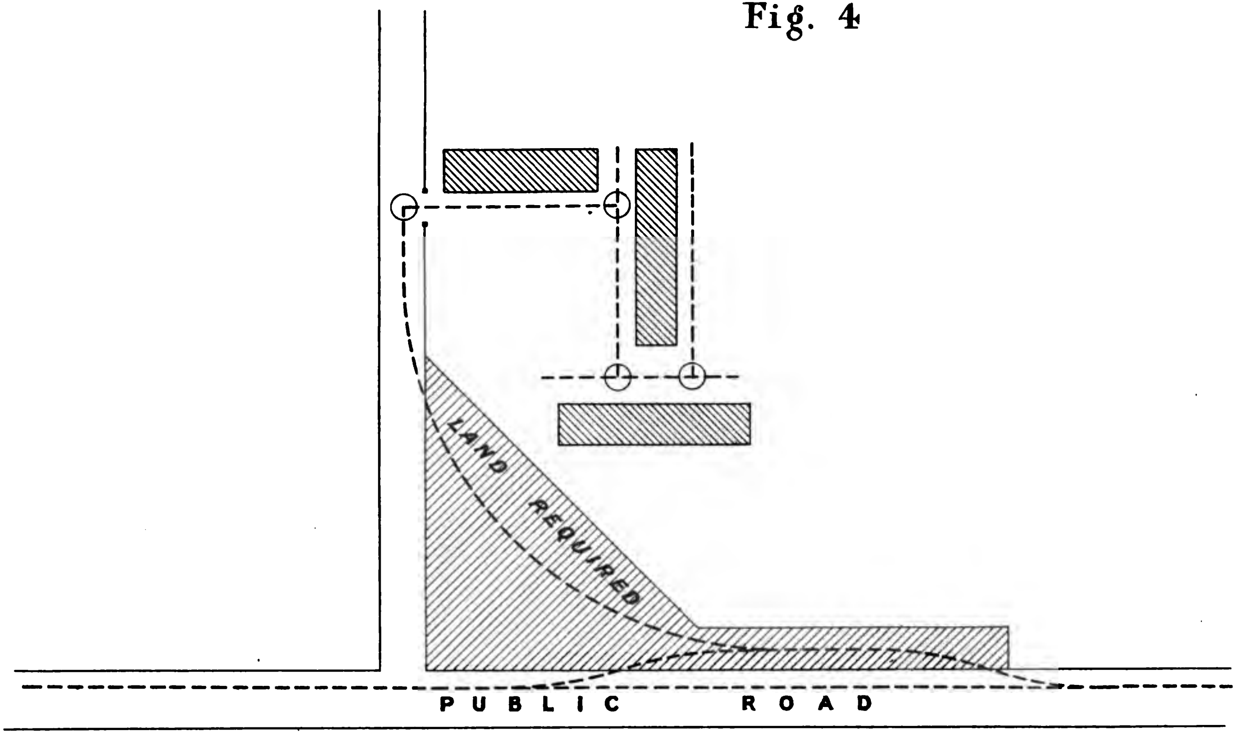
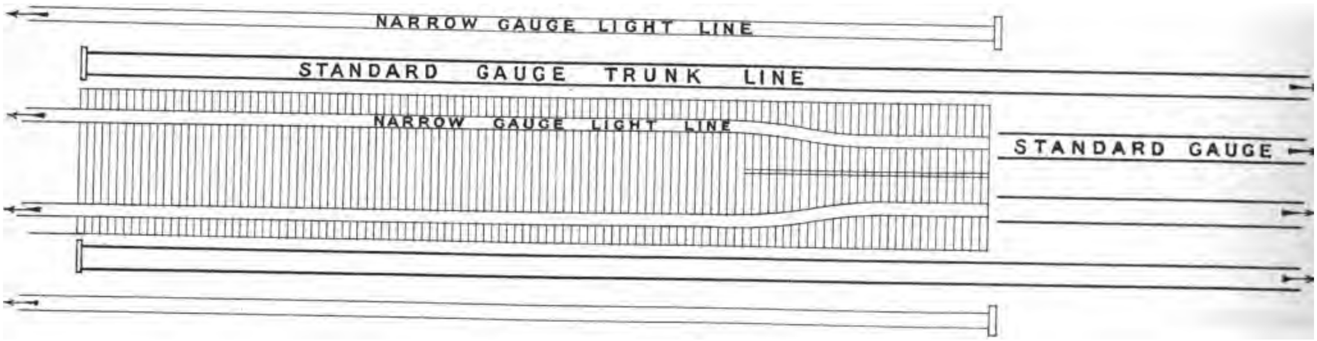


Fig. 5.


NARROW GAUGE LIGHT LINE
STANDARD GAUGE TRUNK LINE
NARROW GAUGE LIGHT LINE
STANDARD GAUGE

gauge ones, so that gravity may assist the transfer of goods from the narrow to the standard gauge.

On either side of the standard gauge sidings on the outside, a narrow gauge line should also run at the same level as regards rails, to admit of easy transfer from the standard to the narrow gauge (Fig. 5).

At the end of the raised bank furthest from the graded approach, there should be two dead-end sidings on the standard gauge meeting two lines on the narrow gauge, one with the floors of the trucks of both gauges level to admit of the transfer of carriages or other vehicles, and the other with the rail level of the narrow gauge at the level of the floor of the standard gauge wagons, to allow of either narrow gauge engines or other rolling stock being easily placed in standard gauge wagons to be sent to the nearest locomotive shops on the trunk line for repairs.

Cranes should be provided for the transhipment of heavy goods, and where there was a large mineral traffic the transfer should be effected by a tilting cradle arrangement from a raised platform at a proper elevation, as on the Festiniog Railway, so that the contents of each truck could be shot down into a receiving one below.

The cost of transhipment would probably vary between 2*d.* and 4*d.* per ton.

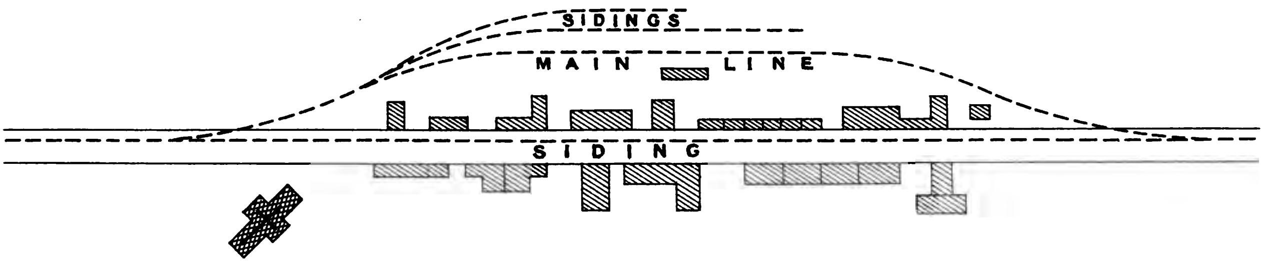
STATION EQUIPMENT.

As little money as possible should be spent in this direction until the traffic has time to develop and it is seen what is really required. Apart, however, from the small sidings placed to serve the various farms, &c., a certain amount must be spent in village stations; and where the existing roads have been taken advantage of for the railway it would be best, at any rate in the villages, to carry the main line on a deviation outside the principal street, on one side of which, however, a siding should be placed so that trucks could stand opposite the houses for loading and unloading goods, coal, &c., and the train be able to run round without interfering with them (Fig. 6). A couple more sidings outside the deviation would also be required for shunting and reserve of rolling stock.

Nothing should be spent on platforms, and as to signals, considering the speed the trains would run, which should always be reduced to half on approaching a station, it ought to be sufficient for a man with hand flags to stand just on the outskirts of the village when the train was expected, and it should be a rule for it to come to a dead stop to pick him up to accompany the train in.

There should be no night running, and it should

Fig. 6.



also be a rule that all trucks be cleared off public roads by sunset, a horse being kept at each station for this purpose, and for shunting in the day-time; whilst at farms, &c., having a siding there should be catch points beyond the public road limits, locked by the train staff, so that it would not be possible for the farmer or trader to cause an accident in this way.

Unless a natural perennial water supply could be obtained at the stations, the engines should water elsewhere at the most convenient streams, the arrangements being as simple and as cheap as possible.

A shed would be required at each station to store and receive parcels and light goods, with a little office for the goods clerk to work in, whilst as regards passengers, tickets should be issued by the guard in the same way as on tramways at a fixed tariff on the Zone system, the fares being, say 3*d.* and 6*d.* for each 3 or 6-mile length or portion thereof, and every third mile from the terminus should be conspicuously marked by a post 6 feet high.

It would simplify matters very much also if tickets were issued for trucks in the same way at so much per truck per Zone, irrespective of the nature of the contents (or at the outside only two or three classes) the specified load of course not being exceeded.

In many cases the Post Office telegraphs might be utilised for the line clear messages, or where the traffic was heavy and constant trains were running, a crossing siding might be provided at every 3 miles at the Zone post, and a small hut erected, containing the necessary block telegraph instruments arranged so that it could only be opened and worked by the guards in charge of the trains, in which case a special wire would require to be provided by the Post Office authorities for the exclusive use of the railway.

COST AND WORKING.

A line on the 2-feet 6-inch gauge in Great Britain, aligned so as to run on the public roads as far as possible, would probably cost as follows per mile for an average length of say 30 miles :—

Land	**£100**
Earth work	**150**
Bridge work	**100**
Fencing	**50**
Ballast	**100**
Permanent way (laid)	**450**
Rolling stock	**350**
Junction arrangements for transhipment	**50**
Station equipment, &c.	**100**
Survey, engineering, supervision and accounts	**50**
Total per mile	**£1500**

and for the same length of line where the roads were not followed.

Land	£200
Earth work	300
Bridge work	300
Fencing	100
Ballast	100
Permanent way (laid)	450
Rolling stock	350
Junction arrangements for transhipment	50
Station equipment	100
Survey, engineering, supervision and accounts	50
Total per mile	£2000

In India the cost would probably be less in most cases by about 300*l.* to 500*l.* a mile, whilst as regards the 2-feet gauge it could be done for about 200*l.* to 300*l.* per mile less than the 2-feet 6-inch gauge.

With regard to working expenses and maintenance, this may be set down at 60 per cent. of the receipts; so that to pay 4 per cent. on a capital expenditure of 2000*l.* a mile, the earnings would require to be 3*l.* 16*s.* 10*d.* per mile per week, and it would be a poor district indeed where from 3*l.* to 4*l.* per mile per week could not be earned.

The writer believes that where carefully and economically laid out and constructed in suitable districts, light narrow gauge lines as feeders to the standard gauge trunk lines would prove a lasting benefit to the farming and trading community, and that in this direction they have a great future; but they should be undertaken by private enterprise; and as far as Great Britain is concerned, no one could do it cheaper or with a greater chance of success than the great railway companies who own the standard gauge railways. And once it was brought home to them, that independently of the extra traffic they might obtain from increased prosperity, these light lines would pay themselves, the work would proceed rapidly.

As far as India is concerned, the following information, taken from the *Allahabad Pioneer* of April 2, 1896, may prove interesting, the writer having added, in brackets, the sterling value of the rupee expenditure quoted, at the exchange of the day.

"The progress made in India in the construction of light railways and steam tramways has been so far insignificant, but after the emphasis that was laid on the subject of feeders by the Viceroy in his railway speech last week, we may expect a new burst of interest in the question, and it may be useful therefore to gain some particulars of the capital outlay, cost of working, &c., of the more prosperous light railways now in existence in this country.

"It is first necessary to mention that as there are practically two standard gauges in India, the broad and metre gauge, lines having a less gauge than the latter are for convenience sake designated light railways. It is true that a light railway may be of any gauge; but as at present understood in India, light lines are short ones of small traffic, and either 2 feet 6 inches or 2 feet in gauge. Their capital cost per mile may be two-thirds to one-half that of the metre gauge, and their mileage earnings may bear the same proportion.

"Relatively to one another, their financial results will depend not only on the amount of traffic they may get, but on the distance it is carried. The importance of this latter condition will be apparent from the figures we are about to produce. From the Director-General's Administration Report, it would appear there are but four light railways at present in India, viz. Gaekwars Dabhoi, 71·6 miles; Morvi, 94·3; Cooch Behar, 21; and Jorhat, 28 miles.

"Of these, the two first are the most prosperous, and their circumstances and position will therefore be analysed. From the railway map it appears that the Gaekwars Dabhoi Railway (gauge 2½ feet) starts from Myagam (a station on the B.B. and C.I.), and runs to Bodeli, a distance of 42½ miles. About midway there are two short branches aggregating 29 miles in length. The capital cost of the whole line is given as Rs. 25859 (1508*l.*), per mile. The gross earnings per mile per week in 1894 were Rs. 66 (3*l.* 17*s.*), of which Rs. 36½ (2*l.* 2*s.* 6*d.*) were due to passenger traffic and the balance to goods. The working expenses amounted to Rs. 40 (2*l.* 6*s.* 8*d.*) per mile per week, or 60 per cent. of the gross earnings. The net earnings were equal to 5·1 per cent. on the capital outlay, and as the capital appears to have been raised at 4 per cent., there is therefore a handsome surplus. The Morvi Railway (gauge 2 feet) runs from Wadhwan (also on the B.B. and C.I.) to Morvi, 68½ miles, with a branch to Rajkot, 26 miles, or 94½ miles in all. Its cost was Rs. 23342 (1362*l.*) per mile; gross earnings per mile per week, Rs. 64 (3*l.* 14*s.* 8*d.*); working expenses Rs. 36 (2*l.* 2*s.*), 55 per cent.; and its net earnings are 6½ per cent. on the capital outlay. The interest charges amount to 4 per cent., so that the surplus in this case is Rs. 54700 (3191*l.*)

"Comparing the traffic of the two lines in coaching, the following differences appear:—

	Gaekwars.	**Morvi.**
Number of passengers	456,800	284,521
Earnings .. .. Rs.	143,727 (£8384)	214,869 (£12,534)

"Hence, although the Gaekwars line had 634 passengers per mile against 302 on the Morvi Railway, the earnings of the former were only Rs. 36½ (2*l.* 12*s.* 6*d.*) per mile per week against Rs. 44 (2*l.* 11*s.* 4*d.*) on the latter.

"This is doubtless accounted for by the greater average distance each passenger probably travelled on the Morvi line, and demonstrates the importance to a railway of having a "long lead" for its traffic. In regard to goods traffic, the earnings per mile per week are respectively, Rs. 29½ (1*l.* 14*s.* 5*d.*) and Rs. 20 (1*l.* 3*s.* 4*d.*) The tonnage per mile is 16,400 on the Gaekwars and 12,400 on the Morvi, or an average of, say 15,000 tons.

"The conclusions to be drawn from these figures are: (1) That a light railway of a 2-feet 6-inch gauge can in ordinary country (India) be built for about Rs. 25000 (1458*l.*) a mile; (2) that with a traffic of Rs. 66 (3*l.* 17*s.*) per mile per week, the working expenses may be reckoned at Rs. 40 (2*l.* 6*s.* 8*d.*), or 60 per cent. of the gross earnings; and (3) that the traffic necessary to produce these results should average about 450 passengers and 300 tons of goods per mile weekly with a mean lead of about 35 to 40 miles.

"There are no figures forthcoming in the Director-General of Railways Administration Report in regard to steam tramways, but it will be useful to mention that lines of 2-feet 6-inch gauge laid on a roadside can be made for about Rs. 15300 (875*l.*) a mile, including rolling stock, and that a traffic of Rs. 40 (2*l.* 6*s.* 8*d.*) per mile per week would produce sufficient net earnings to admit of a dividend of 4 per cent. on the capital."

APPENDIX.

TEXT OF THE GOVERNMENT RESOLUTION REGARDING LIGHT RAILWAY CONCESSIONS.

(From the ***Gazette of India***, dated 17th April, 1896.)

"Branch lines forming feeders, whether to State lines worked by the State, or to railways worked by the companies, will ordinarily be made by the main line administrations, who shall have a prior right to construct them (the concession may be given elsewhere, however, if the previous consent of any railway company concerned is first obtained).

"The Government of India will, from time to time, publish a list of branch lines for the construction of which they are prepared to receive tenders.

"They will consider and dispose of any application for the inclusion in the said list of any other line which can properly be described as a branch or feeder line, and which does not, except in special circumstances, exceed 100 miles in length.

"2. Proposals for the construction of branch lines under this Resolution must conform to the following terms and conditions :—

"(i) Applicants must satisfy the Government that they are in a position to command substantial financial support.

"(ii) The gauge to be adopted must be approved by the Government in each case.

"(iii) The proposed railway shall be subject to the provisions of all Acts of the Legislature applicable to Indian railways.

"(iv) The proposed railway shall be built in accordance with the fixed and moving dimensions for the time being prescribed by the Governor-General in Council, and on plans and estimates that have been approved by that authority. The route of the line, the situation of stations, and other similar details, shall be subject to approval by the Government.

"(v) The line, while under construction, shall be inspected when and so often as an inspecting officer, appointed for that purpose by the Government, may consider desirable with a view to ensure the construction of the line up to the standard agreed upon.

"(vi) Inasmuch as these railways are chiefly required for the development of the country hitherto deficient in means of communication, and the anticipated profits may not therefore at once be fully realised, the Government of India are prepared to give financial assistance as set forth below. Proposals for financial concessions may be made in one or other of the following alternative forms.

"(*a*) It may be stipulated that after the opening of the railway for traffic the Government shall guarantee out of the revenues of India a fixed yearly minimum dividend in rupees on the actual expenditure charged in the capital account of the branch railway company as entered in rupees in the company's books in India, with such share of the surplus net profits as may be agreed upon. The minimum dividend to be guaranteed in each particular case will depend upon consideration of the circumstances, but for the present no offer will be entertained that requires a guarantee exceeding 3 per cent.; or

Under (*a*) the company will receive an absolute guarantee of interest at a rate not exceeding 3 per cent. and a higher return if the net earnings of the branch are sufficient to pay more than the guaranteed dividend.

"(*b*) It may be provided that a payment be made to the branch company by the main line to the extent necessary, together with the branch company's share of branch earnings [see section (6) of paragraph 3] to give the branch company a dividend of 3½ per cent. per annum on the actual expenditure charged in the capital account of the branch railway company as

Under (*b*) the company will receive a dividend of 3½ per cent. provided that the amount of the net earnings from local and interchanged traffic be sufficient, and a higher return if the net earnings of the branch from its own traffic be sufficient to pay a higher dividend.

entered in rupees in the company's books in India; provided always that the payment so made to the branch company shall in no case exceed the net earnings of the main line from traffic interchanged with the branch. This rebate will be granted from the first earnings of revenue by the branch, such payment being calculated at the close of the year, payments on account, however, subject to adjustment, being permissible at the close of the first half of each year. The net earnings of the main line from traffic interchanged with the branch are assumed to bear the same proportion to the gross earnings of the main line from such traffic as the net earnings of the whole system including the branch bear to the gross earnings thereof. If the net earnings of the branch line equal or exceed 3½ per cent. on the actual expenditure as above, the whole of such earnings will go to the branch company.

"In either of the above cases (*a*) or (*b*) if the capital is raised in sterling the capital to be entered in rupees in company's books in India shall be the actual amount realised in rupees from time to time by the several remittances of funds to provide for expenditure in India, together with the sterling outlay from time to time in England converted into rupees at the average rate of exchange obtained by the Secretary of State for his remittances during the half year preceding that in which the outlay shall have been incurred; and the capital expenditure in rupees on which the interest is from time to time to be calculated for the purposes of the guarantee or rebate, as the case may be, shall be the total outlay, whether in India or England, up to any such time as thereto charged.

"(vii.) The general character of the supervision and control that will be exercised by the Government over the branch railway, apart from the provisions of the Railways Acts and the preceding provisions of this Resolution, shall be as follows:—

"(*a*) No capital expenditure by the branch railway company will be allowed as between the Secretary of State and the company unless the prior sanction of the Secretary of State shall have been obtained. The company shall have no power to increase its share or stock capital without the sanction of the Secretary of State, or to borrow money except within a fixed limit and on specified conditions.

"(*b*) The branch railway company, if required, shall keep capital accounts and statistics in forms approved by the Secretary of State: and shall render, free of cost, all accounts and statistics required by the Government. The accounts and books will be subject to audit on behalf of Government. Funds for the execution of new works, properly chargeable to capital, found necessary after the branch railway has been opened to public traffic, shall be provided by the branch railway company. Such works and their cost shall be agreed upon between the branch railway company and the main line administration before they are put in hand. In the event of any difference of opinion arising between the branch railway company and the main line administration as to the necessity for and the cost of any work, the matter shall be referred to the Director-General of Railways as arbitrator, and his decision shall be final.

"The rates and arrangements in force on State railways in the matter of services rendered to all departments of the State shall apply.

"3. The following are the principal additional concessions admissible for branch or feeder railways for the construction of which tenders may be invited:—

"(1) The Secretary of State for India in Council or the Government of India, respectively, will permit the charge of interest at a rate to be agreed upon in each case, during construction, to the capital account of the railway under the terms of the Indian Railways Act of 1894 (57 and 58 Vict., chapter 12) or the Indian Railway Company Act X of 1896.

"(2) The land required for the construction of the branch railway will be provided free of cost.

Such grant shall include land required for quarrying ballast, brick fields and kindred purposes.

"(3) Electric telegraphs and telegraphic appliances will be supplied and maintained by the Government of India at the usual charges for such works.

"(4) The results of existing surveys will be made available free of charge. When desired, fresh surveys will be made by the Public Works Department of the Government of India of any branch railway on the applicants depositing the estimated cost thereof in a Government Treasury, on the understanding that no preferential claim to a concession is thereby established. If permission be eventually given for the construction of the line, the actual cost of all such surveys, as well as of those made at the cost of Government, may be included in the capital cost of the railway. No responsibility will be accepted by Government for the accuracy of any survey, plan, estimate or other information supplied.

"(5) The branch railway may be constructed by the main line administration, and will be maintained and worked by that administration during the full currency of the contract to be entered into for the purpose, at a fixed ratio of expenses to earnings in each half year. The ratio will, when the branch railway is of the same gauge as that of the working railway, usually be that obtaining on the whole system as from time to time existing, including the branch railway, but will not exceed 50 per cent. of the gross earnings of the branch from all sources, and will be inclusive of charges for the use of the main line rolling stock.

"(6) Such expenses on account of the Board Direction of the Branch Line Railway Company as may be incurred with the sanction of the Secretary of State may be charged—

"(*a*) during construction to the Capital Account of the Branch Line Company;

"(*b*) after opening, and until the minimum dividend under paragraph 2 (vi) (*a*) or (*b*) is received by the Branch Line Company, as part of the working expenses to be met out of the stipulated percentage of the earnings of the branch taken by the working railway:

"(*c*) and thereafter out of the general receipts of the Branch Line Company.

"(7) Railway materials for the branch railway will be carried over State lines at the special rates prescribed for such materials belonging to State railways.

"4. The Government of India reserve the right to purchase all such branch railways at the expiry of twenty-one years, or at subsequent intervals of ten years on twelve months' notice, the purchase price being twenty-five times the yearly average net earnings not including rebate payments, of the three years preceding the purchase, with a maximum price of 120 and a minimum of 100 per cent. of the cost price on a rupee basis.

"5. The Government also reserve—

"(i) The right to fix and vary from time to time the classification of goods, and maximum and minimum rates for each class of goods, as well as of passengers; and

"(ii) a general control in respect to the number and timing of trains.

"6. Applications for concessions to construct branch railways under the terms of this Resolution should be submitted, in the form prescribed by Memorandum A hereto attached, to the address of the Secretary to the Government of India, Public Works Department.

"7. Applications for fresh surveys to be carried out on the terms detailed in condition 3 (4) above should be submitted in the manner prescribed by Memorandum B, hereto attached, to the address of the Secretary to the Government of India, Public Works Department."

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